FROST & SULLIVAN

ENTERPRISE CONTENT MANAGEMENT
Sophisticated Tools for Modernized Healthcare Delivery

A Frost & Sullivan White Paper

INTRODUCTION

The current debate raging in the U.S. over the future of the healthcare system is hardly indicative of something new. The healthcare industry has faced harsh criticism over high costs and inefficiencies for the past two decades, but in the current climate of economic recession, these critiques have become louder and more persistent. Meanwhile, in Europe, a World Health Organization survey in 2000 found that France had the world's best health system. Yet, like health systems across Europe, France's system has focused on reducing costs and increasing efficiency as well. Another highly ranked country, Switzerland, dropped to eighth place in a Europe-wide survey in 2008 amid cost-cutting and higher rates of medical mistakes being noted in hospitals in major cities.

At the same time, the healthcare systems across Europe and North America are faced with servicing an aging population with increasing healthcare needs and meeting rising expectations of patients to employ recent scientific advances to treat disease conditions that were previously considered intractable. Layer on the current economic downturn, and hospitals are on the forefront of dealing with opposing forces of being more efficient and proving better outcomes.

There are places where gains can be made. As individual healthcare provider and payer organizations are scrambling to cut costs while maintaining a high standard of patient care, they have been slower to utilize the tools of information technology that have been successfully deployed in other industries. The recent push to deliver personalized, integrated healthcare has led to an explosion of healthcare data, in a plethora of formats and media, all of which needs to be capable of being rapidly retrieved by a number of stakeholders. The efficient management of such a diverse array of voluminous content, using Enterprise Content Management, is one area which can potentially lead to substantial optimization of operations, reduction in costs, and enhancements in patient care.

WHAT IS ENTERPRISE CONTENT MANAGEMENT?

The Association for Information and Image Management (AIIM) defines Enterprise Content Management (ECM) *as the strategies, methods and tools used to capture, manage, store, preserve, and deliver content and documents related to organizational processes.*

ECM strategically focuses on four different content areas, namely Create/Capture, Manage, Deliver, and Archive & Dispose.

There was a lot of discussion in 2009 around Electronic Medical Records (EMR) and Electronic Health Records (EHR), and governments around the world have committed to the implementation of these systems, most recently through committed funding to support EHR adoption in the U.S. economic stimulus bill and the Obama administration's renewed commitment to the 2014 deadline for electronic record deployment. Beyond medical records, hospitals and payers have so much content that needs to be managed, integrated, and incorporated via an ECM solution to allow for increased data analysis and manipulation to improve both patient outcomes and financial management.

The CAPTURE of this vast amount of varied content creates opportunities to enhance image quality, identify document types, extract data, and validate indexed data against back-end applications. Once all content is in electronic form, it can be MANAGED to provide search capabilities, security and access controls, records management and retention policies, workflow and business processes, etc. Perhaps the biggest payoff in this process is the DELIVERY. Content is now available to be delivered to just the right person, at just the right time, and in just the right format to ensure a smooth and efficient process. Finally, the process of managing the end of the lifecycle is straightforward with ARCHIVING and DISPOSAL. An organization can specify how long a piece of content should be retained, where it should "live," and when it should be destroyed, ensuring you stay compliant at all times.

ECM can capture and incorporate existing content from a variety of sources and support current applications by integrating with existing solutions. ECM manages content from other enterprise applications such as Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), and enterprise portals. Instant secure access to electronic content, and the ability to control access by appropriate users through workflow, is a key need of many hospitals and health insurers who have layers of forms, formats, and required regulatory compliance issues to address. ECM can help in automating electronic workflows in healthcare organizations so as to integrate and optimize a number of different business processes. It carries out workflow and lifecycle management, and adds intelligence by creating categories, metadata, and tags that make search and retrieval faster and more efficient.

ECM can increase efficiency in healthcare organizations by converting tedious, error-prone manual activities into performance-driving operations. Its application is not limited to direct patient care. It can also be applied to policy and procedure management, business workflow processes, and documents such as contracts, invoices, HR documents, and directories that support patient care, as well as the business needs of the organization. ECM addresses all process needs with a single solution that provides the right information, in the right place, at the right time, in the right form, and in the right context.

Additionally, ECM can contribute to improved patient outcomes by providing key information to a variety of stakeholders throughout the healthcare value chain, and by documenting patient treatment and outcomes from across the value chain.

WHY IS ECM NEEDED IN HEALTHCARE?

Recent trends in healthcare have led to a profusion of types of healthcare content, and modern healthcare depends upon the reliable, rapid and secure exchange of this information throughout a large healthcare organization. The criticality of this information, and the fact that it needs to be available to different stakeholders throughout a large enterprise, makes tools for ECM indispensible in large healthcare settings. Some of these trends are explored below:

Content explosion in healthcare: It is estimated that in 2010, medical centers will need to hold almost 1 billion terabytes of data, or almost 2 trillion file cabinets worth of information. Even today, the scan of a single organ in one second creates about 10 gigabytes of raw data. New types of application niches like speech recognition and huge amounts of rich media such as medical images, digital photos, email, and video have been introduced in the recent past, adding to the existing content. The multiplicity of payers, providers, and suppliers add to the chaos. Efficient management of different types of data is a key strength of ECM in healthcare.

Shift towards EMR/EHR: Electronic Medical Records will be required for all U.S. citizens by 2014, and new money to incentivize the implementation of EMR systems in smaller physician practices is a key focus of the U.S. economic stimulus bill passed by Congress this past spring. The EMR market in Europe is growing by a rate of 18.5 percent. As of now, it is estimated that only 30 percent to 50 percent of a medical record is electronic, while the rest is paper-based or in other forms of content. Healthcare organizations are faced with the huge task of scanning paper-based documents and digitizing them to meet the EMR vision. However, some organizations are leapfrogging ahead by not only putting together medical records, but also including the billing and financial details to create a comprehensive Electronic Health Record. Reliable document management is essential for creating EMR/EHR systems that are comprehensive, user-friendly, and interoperable.

Concerns around compliance: Healthcare is a highly regulated field, with multiple laws overseeing how healthcare data is used and reported. Most healthcare organizations need to comply with the Health Insurance Portability and Accountability Act (HIPAA), which provides a nationwide privacy and security framework. In addition, the U.S. regulatory body the Joint Commission sets standards for the safety and quality of patient care. The Joint Commission conducts periodic on-site surveys to verify that an accredited organization meets its standards. The Sarbanes Oxley Act of 2002 imposes specific financial reporting mandates on public healthcare organizations. In Europe, the European Medicines Agency (EMEA) evaluates and monitors healthcare products and develops technical guidelines. By managing access to different documents, creating audit trails, etc., a good ECM infrastructure can help a healthcare organization comply with the various regulations.

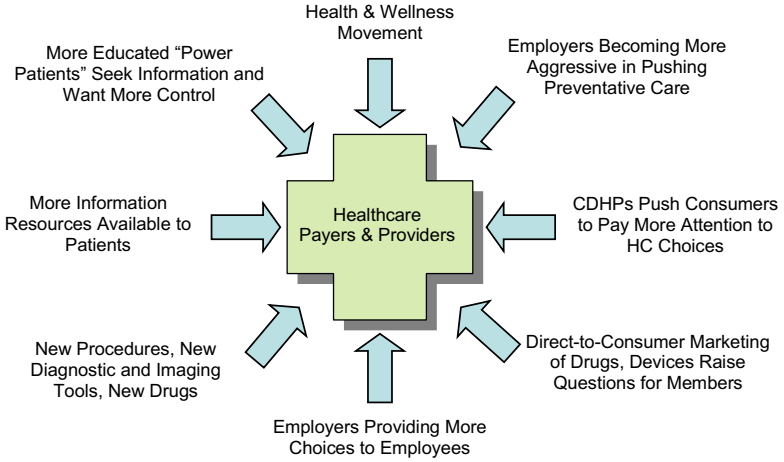
Emergence of Evidence-Based Medicine: While the modern practice of medicine mandates the use of medical practices that have demonstrably superior outcomes in clinical trials, this goal has been difficult to achieve in practice, largely due to the inability of clinicians to keep up with the ever-growing mountain of clinical data and its increasing complexity. However,

efficient content management can help in creating a searchable repository of clinical studies that will help streamline decision-making processes in a clinical practice setting.

An ECM platform allows you to integrate more information and bring in more stakeholders to collaboration and information access/awareness than integrated EMR solutions. Through an ECM implementation, all stakeholders in the healthcare value chain can get access to information regarding an individual patient's test results and current medication regimens, achieving the goal of improved outcomes through better information flows between healthcare providers, payers, etc. The integration of the information from the healthcare value chain via ECM provides the payer or provider the inputs needed to support pay for performance initiatives, as opposed to the pay for procedure structure that is a factor in higher costs and wasted spending within the current healthcare system.

Growing needs for a collaborative workspace: To adhere to evidence-based medicine, information needs to be consolidated from diverse sources such as third-party databases, standard protocols, physician visits, medical imaging data, clinical trials, literature references, transcriptions, prescriptions written, etc. In addition, the information needs to be viewed and vetted by various individuals, including primary care physicians, specialty clinicians, administrative personnel, employers, financial services, and claims processors to collaborate to determine appropriate care protocols, medication administration, and standard operating procedures. An ECM infrastructure can provide a collaborative workspace which can enable distributed individuals and teams to work together more efficiently and effectively toward enhancing their existing systems.

Consumer-centric Healthcare: Many government and industry leaders are of the opinion that empowerment of consumers by providing them with convenient access to networked healthcare services can lead to improvement in healthcare services. Consumers today are demanding decision-support tools and information to help them make wise choices about their care. Also, patients are being increasingly monitored and consulted at home, and the use of telemedicine and remote patient monitoring applications are expanding. More patient education by providers, pharmaceutical companies, device manufacturers, as well as payers, and more frequent use of remote monitoring and telemedicine, means that information flow is no longer a one-way process. Interaction and information exchange among different players can be enhanced and streamlined with an ECM solution.



Getting the right information to the right people at the right time is a key factor for improving healthcare outcomes. Transferring a single record from millions of records to all the applications and users who need it, while making sure that the data is both highly available and secure in its delivery, is the need of the hour. Physicians need to quickly and easily access patient demographics, medication records, lab results, and other critical patient information from a mobile device or desktop, no matter where they are located. Audits of third-party administrators, pharmacy benefit managers, plan eligibility, and providers are an effective way to reduce healthcare expenses. All of these depend upon easy access to the correct information in a reliable manner; which forms the basis of an ECM solution.

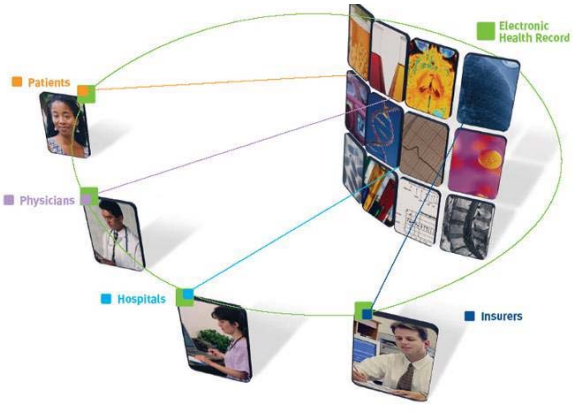
ECM APPLICATIONS IN HEALTHCARE

With the increasing drive for cost reduction and efficiency, the need to drive clinical collaboration and to evaluate patient outcomes, and increasing two-way communications with patients via information and connectivity through remote or home-based solutions or via the Internet, there is a need to capture, manage, and deliver the explosion of content of various forms being created in modern healthcare organizations. The benefits derived from application of an ECM solution impact healthcare organizations in various ways.

Clinical:

Electronic Health Records: Unlike EMR systems, EHR systems can take all of the healthcare organization's records and content, including financial and clinical data, and integrate it into a patient-centric record. ECM solutions have been successfully deployed to realize the EHR vision, with the following benefits:

- ECM avoids fragmentation of information across diverse processes; ECM can pull information from diverse information systems, such as radiology, laboratory, etc., and establish a single common repository where data and content can either be stored or cross-referenced while integrated with existing systems.
- An ECM solution leverages unstructured data along with an existing electronic health or medical record to provide centralized viewing (either developed or via the EHR) for all patient information, starting from simple scanned paper documents to complex forms of content (audio, video, email, fax, etc.) or electronic content. Workflow can be enabled to allow the automated routing of critical clinical/financial information and processes.



- Data storage requirements: Most hospitals need to store data for at least 10 years or more, in ways that would satisfy legal requirements and archiving directives. Furthermore, to make recording, storage, and further processing of data efficient and user-friendly, it must be stored in such a way that, irrespective of its format (office applications, email, scanned documents, etc.), it is available quickly, securely, and is up-to-date at any time to be processed further. ECM's document management and document imaging solution with scanning, indexing, workflow, integration, and distribution and tracking functionality helps healthcare organizations comply with their storage needs.
- Hybrid medical records: Hospitals implementing EHR or EMR software also need a fast and efficient way to transform paper to electronic information. ECM solutions include automated scanning and data capture solutions, which can transform paper documents into useable electronic information. This makes the workflow efficient, as physicians are no longer limited to viewing patient records only at the hospital, but can access it from their homes and simultaneously while others are viewing it.
- An ECM solution also can structure retention policies and record management to support organizational needs and regulatory requirements.
- With all content captured electronically, an ECM solution supports process improvement and workflow, and provides a platform supporting collaborative environments for team productivity.

Clinical Knowledge Management: The information management infrastructure of an ECM solution can help set up a repository of clinical evidence for a healthcare organization and help in collaboration amongst different scattered departments. Healthcare practitioners increasingly face clinical situations in which they must process and manage a variety of data and information sources—such as diagnostic test results, medication lists, past treatment history, and the latest evidence-based medicine practices.

ECM solutions support the goal of unifying fragmented clinical review processes, the clinical build process, quality performance programs, people, projects, and siloed systems to drive better decision-making. By incorporating collaboration with governance and a multidisciplinary approach, the result is improvements in business process management, clinical program management, patient care, and quality outcomes. This provides a healthcare organization with a solid foundation for competitive business advantage.

- Information Repository: Document management technology provides a centralized repository for a library of clinical evidence, emails, content and supporting documentation, which can be accessed throughout the enterprise. ECM can also be used to manage the lifecycle of content for the healthcare system's clinical decision support system. With all discussions and documentation in a single repository, ECM also supports more efficient compilation of information for auditing purposes.

- Collaborative Workspace: ECM can be used to create a collaborative workspace for clinicians to reach consensus-based decisions. ECM enables control over critical information by allowing users access to a searchable knowledge management portal.
- Rapid, reliable access: Its highly granular control enables secure, selective information sharing both internally and externally to an organization. Information can be accessed in seconds, and users can review information when needed and also simultaneously. As the content is electronic, expenses related to printing, delivery, etc., are eliminated, and this makes the process of information access cost effective.

Financial:

Payer claims processing: ECM solutions can help payer organizations achieve speed and accuracy in processing claims by automating data and image capture from complex paper and electronic CMS 1500 and UB-04 claims forms.

- ECM solutions have the ability to capture 100 percent of the fields on a claim, leading to better customer service by being able to provide complete claim form information. The optical character recognition (OCR) feature of ECM can automate reading of medical claims for validation through existing adjudication systems.
- Automation of processes eliminates manual data entry function through scanning, and the error rate in inbound data can be reduced dramatically, to being almost negligible. Thus, the return on investment for an efficient ECM solution can be achieved quickly.

Revenue cycle management: Many healthcare providers still employ paper-based, manual payment processing methods. An ECM solution provides centralized patient financial information and a common repository - including scanned documents, such as driver's licenses and insurance cards, and electronically captured data, such as ADT information and EOBs, from registration, clinical care treatment and diagnosis, claims submission, and denial management.

- There are more than a hundred types of Eligibility of Benefits (EOB) forms which need to be processed, and retrieving an EOB file for a claims query is time consuming and prone to errors. Accuracy is critical in these cases, since reimbursement is based upon this information. ECM solutions overcome this difficulty by scanning the EOB forms and then editing them. The payment details can be extracted from the EOBs and stored and retrieved as a file.
- ECM solutions enable a healthcare provider to streamline the claims process from start to finish, improving the accuracy of collected information and submitted claims. According to Hospital Accounts Receivable Analysis (HARA), more than 10 percent of healthcare organizations' claims are denied. These denials can stem from innocuous

clerical errors at the beginning of the claims process – such as incorrect information on the patient registrations – and other clinical administrative errors. The results are lost staff time spent refilling the claim or chasing down correct information, slower reimbursements, increased costs and lower margins, increased DSOs, and ultimately, lower profitability. Manual, paper-based processes add to these challenges as paperwork is lost, incomplete, or inaccurate.

Administration:

There are many instances of ECM solutions being successfully deployed in various administrative routines involving different aspects of content management. Here we briefly touch upon five such examples:

- *Risk Management:* ECM solutions help ensure legal and regulatory compliance, including those related to billing, state licensures, medical certifications, and federal and state privacy and security regulations. One example is the automation of incident reporting, otherwise a time-consuming process. Nurses usually hand-write the incident report and distribute it to relevant people. However, this process makes it difficult to keep track of individuals notified or to track a lost report. ECM provides online forms for reporting incidents and ensures full completion of each form. Additionally, it automates work flow and routes the form to all individuals and sets a response time. Periodic analyses and extensive reporting on incidents made possible through ECM tools helps reduce the insurance rates for these organizations.
- *Audit Management:* Failure of an audit due to missing documentation can result in loss of accreditation and increased insurance premiums for healthcare organizations. ECM solutions have audit management tools that bring about scanning, storage, and collaboration of documents in a common searchable repository. This ensures rapid and secure accessibility to information required for Joint Commission audits and for payer organizations, such as Blue Cross, Medicare, etc. ECM solutions greatly reduce the time taken to search for physical files, decrease the risk of finding incorrect documentation, and limit the amount of documentation provided to the auditor. By having all information related to patient care in an easily searchable repository, customers have reported up to 80 percent reduction in time required for Joint Commission accreditation.
- *Contract Management:* In a typical organization, hundreds of contracts need to be printed, shipped, or hand-delivered to the appropriate individuals and signing authorities. Creating and negotiating using hard copies of contracts is a time-consuming process and can sometimes lead to incorrect payments. ECM tools enables administrators to get copies of contracts online rather than tracking down a paper copy. It also allows the legal departments to proactively manage contracts via a dashboard and by alerting them to expiration dates and other important dates, and maintaining tight control over the lifetime of contracts to ensure that expired contracts are not inadvertently used, nor

are final versions of contracts unintentionally altered.

- *Web site Management:* In large organizations, the IT department often supports multiple Web sites for various departments, each using a slightly different method of site maintenance. This leads to bottlenecks in posting novel content or eliminating outdated content from the Web sites. ECM Web content management tools overcome these problems by managing the creation, editing and delivery of new or existing content, automating conversion to different display formats and versions, and increasing security by locking down access to production and staging Web servers. This has reduced publishing time from days to hours in client organizations, resulting in leaner teams of Web developers, streamlined back-up strategies, and an integrated Web development environment with simplified Web deployment.
- *Improved Customer/Employee Satisfaction:* By eliminating expensive paper-based and manual communication processes, ECM tools enable rapid and streamlined access to customer/employee records by the customer service and human resources (HR) staff. ECM enables the creation of personalized employee sites, which increase the use of self-service tools and reduce HR costs. These enhancements also increase employee satisfaction, since employees no longer have to face long wait times for requested information or deal with missing data or delayed delivery. Similarly, ECM also improves customer-communication management by providing a single publishing solution for all customer communications.

HOW DOES ONE IMPLEMENT AN ECM STRATEGY?

ECM in healthcare is not just about document management; it applies to every business unit within the organization that creates, maintains, or uses electronic or paper-based records. ECM design is specific to a particular organization and is based on its structure, content types, processes, and systems. The process for selecting and implementing an ECM infrastructure is: identify the underlying organizational needs and plan to meet specific business objectives.

ECM is not a rip and replace strategy that involves devaluing the investments an organization has already made in information and content systems and the applications that drive this information into useful decision-making. On the contrary, an ECM solution leverages and increases the value of these investments by further integrating information and applications in use by the enterprise, tying them together and expanding their reach across the organization and to other stakeholders if desired.

Achieving a fully implemented enterprise-wide content management infrastructure may take several years, and implementation can be done in a staged fashion rather than all at once. Point solutions are often an effective method of implementing ECM within an organization. Many organizations have not enabled all the applications in place that an ECM solution is capable of supporting. ECM can be built out in a modular approach. It can be structured

around any existing applications, allow seamless addition of new applications, and new internal business units or user groups to be incorporated over time, so that an organization can customize the information system based on its current status, unique needs, and future growth plans. Starting the process with business units that need data compliance and regulatory standards – such as medical records, finance, human resources, and internal audit - may help expedite the early phases of ECM implementation.

WHICH ECM SOLUTION IS RIGHT FOR YOU?

There are multiple vendors providing Enterprise Content Management solutions, each of which needs to be modified and customized to a specific organization. Selecting the right ECM solution depends upon specific needs of different organizations, and no cookie-cutter solution fits all healthcare enterprises. ECM solutions should be evaluated on the basis of their flexibility, scalability, interoperability, integration with other document management tools, ease of use and implementation, and a customer support network that includes technical help, training, and user forums.

In the following case studies, we explore Enterprise Content Management solutions provided by EMC - one of the most widely used vendors in the field.

ABOUT EMC SOLUTIONS

EMC offers an Enterprise Content Management suite of products and solutions, ranging from business process management, collaboration and document management, compliance, document capture, records management, digital asset management, Web content management to content security.

EMC's Enterprise Content Management solution is a platform consisting of three main layers, all within a compliance infrastructure:

- A Repository for all content types
- The Services supporting that content
- The Presentation or User Display

Healthcare providers and payers drive significant benefit from the ability to mix and match content types, so a common repository is the preferred strategy.

A common set of services can be coordinated and utilized in modular fashion, providing the functionality needed for a particular point solution implementation, keeping costs down.

Examples from healthcare deployments include:

- Automatic Information Classification – which provides intelligent scanning and can

identify what is the content type, then can extract the data and utilize it to automatically construct metadata or reports. This can be utilized as a service to support Claims Processing.

- Information Rights Management – provides security outside of the repository and outside of the firewall by managing who can access, view, print, copy, and for how long, with a continuous audit trail, supporting HIPAA Privacy implementation.
- Federated Enterprise Search – this is a search engine which allows search across multiple repositories and presents the information back in a single Google-like consolidated view, supporting a virtual repository for patient records.

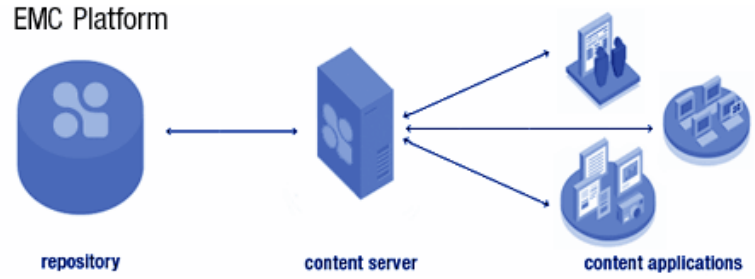
The repository can be accessed from virtually any application or client type. EMC can provide a customized front-end, allowing for the creation of new views based on customer needs, or a hospital could use an existing EHR application on the front end.

Rich Set of Content Services:

Basic Content Services	Business Process Management	Content Capture	Information Rights Management	E-mail Ingestion	Web Publishing	Security	Enterprise Reports Archiving
Document Image Management	Automatic Information Classificatio	Compound Document Management	Lifecycle Management	Unified Desktop	Web site Management	Federated Enterprise Search	SAP Archiving

Three of their most widely used offerings in healthcare are Documentum®, Captiva® and Document Sciences®.

EMC Documentum® is a unified enterprise content management platform for storing a wide range of content types within a shared repository.



As is shown in the diagram, the three fundamental elements of Documentum platform are the content repository, content services, and content applications:

- Content Repository helps create content applications and solutions on a single foundation and build a common content repository for all content types, including documents, scanned images, Web pages, XML, rich media, records, engineering drawings,

reports, and many others.

- The Content Server is the heart of all content services provided by Documentum and provides a variety of content services common to all content types, including delivery, access control, versioning, search, workflow, and many other services.
- Content Applications help access content in the Documentum repository and Documentum content services by leveraging Web services.

Besides managing documents for print or electronic distribution, Documentum can be integrated with external Web applications and distributes content to portals, servers, and Web sites. Multiple capabilities have been added to it over the years, including records management, digital asset management, enterprise content integration, business process integration, imaging, and collaboration.

EMC Captiva® intelligent document capture solution is part of the Documentum platform and helps transform information from paper, fax, and electronic sources into business-ready digital formats. The Captiva suite of products includes not only document capture, but also forms processing, invoice processing, intelligent document recognition and classification, distributed capture, imaging solutions, applications monitoring and premium services. All these products can be embedded into any specific application so that one can leverage the power of these capture and extraction tools to manage data better.

EMC Document Sciences® software suite enables organizations to automate the creation and delivery of well-designed, highly personalized customer communications, including relationship statements, contracts, profit/loss reports, marketing collateral, and correspondence.

EMC has helped thousands of healthcare organizations, both payers and providers, to store, protect, optimize and leverage information through their innovative technological advancements. The following case studies are illustrative of the various strengths that EMC can bring to bear in healthcare enterprises.

CASE STUDY: Emory Healthcare Takes an ECM Approach to Knowledge Management, Increasing Efficiencies, and Improving Patient Experience

Organization: Emory Healthcare is the largest healthcare system in Georgia, with 30 health centers, approximately 1,200 beds,and 10,000 employees serving the metro Atlanta area. Emory Healthcare is the clinical arm of the Robert W. Woodruff Health Sciences Center of Emory University, tied to the Emory University School of Medicine. Emory Healthcare provides primary and acute care, and was ranked in the top 50 hospitals in 2009 by U.S. News & World Report in 11 specialties: Ophthalmology; Psychiatry; Geriatrics; Heart and Heart Surgery; Neurology and Neurosurgery; Ear, Nose and Throat; Kidney Disease; Diabetes/Endocrinology; Gynecology; Urology; and Cancer.

Challenges: With a wide range of services offered across many campuses, Emory, like many health organizations, has no shortage of data, all resident on different platforms. One area where integration and cleansing of the data and processes is key for not only efficient delivery of quality care, but also accurate billing and planning, is patient data. Dedra Cantrell, the CIO of Emory Healthcare, described the "tribal knowledge" held by various departments on patients – isolated stores of information located within a variety of applications across the organization, handed down within each silo, but not easily transferable or accessible to others across Emory Healthcare.

Solution: Emory and CIO Cantrell implemented an Enterprise Content Management solution from EMC to allow them to "harvest this information, manage it, and send it to the right people for action." The Enterprise Patient Access system implemented leveraged applications already in place in the organization, linking 10 systems from a variety of vendors, including Documentum (EMC); hospital patient management system (McKesson); scheduling, registration and billing system for the organization's clinics (GE/IDX); EMR system (Cerner Millennium); and a patient denial database and other niche homegrown systems. Parallel goals in this effort were to improve knowledge management inside Emory, increase efficiencies in internal processes, and improve the patient experience.

On the internal workflow side, the system needed to normalize and automate processes of registration, scheduling, and financial clearance. Data harvested from the system needed to trigger workflows to compare and fill in gaps or check and rationalize information across parts of the organization. Efficiencies were gained in eliminating duplicate steps and paper forms to be filled out. The systems allows employees involved across the organization - financial managers, administrators, and clinicians - to access information in the system, take actions against cues and triggers initiated by the system, and track who does what, all in a HIPAA-compliant platform.

From the patient perspective, one area that Emory sought to improve was in making the visit as efficient and streamlined as possible, without redundancy in providing information such as insurance and demographics. Knowledge workers interacting with patients across the organization now have all available tools and information held within the organization

at their disposal, allowing them to update and validate information held within the system, and providing them cues and alerts to respond to with regards to any individual patient's data. Patients are no longer required to re-enter information the organization already holds, reducing paperwork and improving patient flow.

In a similar way, the ECM solution was able to address the integration of data from the four different systems that house provider information across Emory Healthcare. Again, according to Cantrell, "Different departments owned information separately. Now these departments populate and update a central system. Now we have one source of truth for provider information."

With a Personal Health Record and patient portal already in place, the Enterprise Content Management solution allows Emory to now integrate this with ECM tools, allowing patients to update information, complete forms, and gain access to their medical history and results of tests. Emory intends to leverage the ECM solution to support implementation of a Medical Home model as a next step.

CIO Cantrell stressed that while it can be hard to make the case for ROI on infrastructure investments prior to the implementation of the solution, the ECM implementation supported stated goals of Emory's leadership to improve patient access and customer experience, and provide the right enabling technology to support staff to allow them to focus on clinical outcomes while improving throughput at clinics and turnaround time for appointments.

Cantrell gave EMC's Enterprise Content Management solution high marks for "scalability, the ability to manage content and leverage the benefits of interoperability." As with any major IT implementation, "Partners are important. We were looking for a partner, not a vendor, someone who could support us with automation and workflow" issues, not just software, Cantrell said. "We partnered with Paragon Solutions to assist us within our workflow and design efforts. They helped by providing their expertise and knowledge around process management optimization. This allowed for a scalable, repeatable methodology to manage the complexity inherent in the automation of content management across a large academic health system."

CASE STUDY: Blue Cross Blue Shield of North Carolina

Organization: Blue Cross Blue Shield (BCBS) of North Carolina is the state's largest health insurer, with more than 1.8 million members.

Challenges: BCBS headquarters in North Carolina processes and adjudicates more than 16 million medical claims per year. It faces the constant challenge of increasing speed and efficiency, while validating diverse types of data, maintaining the integrity of its operations, and keeping its operations up to date.
Solutions: EMC Captiva® FormWare® software was deployed by BCBS to increase

productivity, achieve Y2K compatibility, and apply customized data validation. With the new software, medical claims such as HCFA 1500 forms could be scanned using Kodak 9500D scanners. The resulting TIF files are tagged for monitoring and sent to Captiva FormWare, which automatically reads the machine print from the forms using its optical character recognition (OCR) engine. Characters not recognized by FormWare are automatically signaled for manual entry by operators. The OCR process allows for a common front-end process rather than requiring the manual entry of claims.

User Experience: Using EMC's Captiva solutions helped BCBS of North Carolina increase their productivity from approximately 540 claims per person per day to 625 and above. The user interface was in plain English, making it easier for the operators to use and navigate the new system, which led to a faster adoption and a shorter learning curve. Additionally, the software allowed repositioning of information, providing the operators with a clearer context by establishing relationship of one field with the next, thus enabling them to make better interpretations. Further enhancements in FormWare enabled the software to handle forms processing and document image capture as well, which helped BCBS further streamline its workflow.

"We selected EMC Captiva's software based on its strong heritage of accuracy and performance processing high volumes of forms."- Jill Blake, Director of Claims Operation at BCBS, North Carolina

CONCLUSION

Successful healthcare enterprises in the future will be differentiated by their ability to better manage, integrate, analyze, and leverage clinical, financial, and administrative information across the organization and the broader healthcare community. Enterprise Content Management helps healthcare organizations, both payers and providers, to achieve this through its various applications.

In healthcare, adoption of ECM is currently driven by the 3 C's: Compliance, Consolidation, and Collaboration. Compliance with regulations such as HIPAA, Sarbanes-Oxley Act, as well as operational guidelines set by the Joint Commission, which produce a heavy burden of secure data transmission and reporting on healthcare organizations, is greatly eased by the use of ECM solutions. ECM also helps with processes requiring consolidation, such as maintenance of EHR records, since it allows for management of diverse content in a standard repository instead of running disparate systems to manage documents, rich media and digital content, and records. Finally, ECM infrastructure can establish collaborative workspaces to outline business processes and coordinate supplier, partner, and customer activities. Tying collaboration to critical business processes enables organizations to improve client relationships, optimize supply chain, and accelerate innovations.

CONTACT US

Silicon Valley
331 E. Evelyn Ave. Suite 100
Mountain View, CA 94041
Tel 650.475.4500
Fax 650.475.1570

San Antonio
7550 West Interstate 10, Suite 400,
San Antonio, Texas 78229-5616
Tel 210.348.1000
Fax 210.348.1003

London
4, Grosvenor Gardens,
London SWIW ODH,UK
Tel 44(0)20 7730 3438
Fax 44(0)20 7730 3343

877.GoFrost
myfrost@frost.com
http://www.frost.com

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